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Anisotropic magnetization of the Van Vleck paramagnet LiTmF4 at low temperatures and high magnetic fields

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Abstract

Lithium thulium fluoride LiTmF4 is an insulating Van Vleck paramagnet with a giant magnetostriction. Magnetization of the tetragonal LiTmF4 single crystals was measured for the first time in the temperature range of 2-300K and in magnetic fields up to 55kOe, oriented both parallel and perpendicular to the C4 symmetry axis. In particular the angular dependence of the magnetization in the basal plane was studied. The anisotropy of magnetization in this plane grows rapidly in high fields. The temperature dependence of the magnetization in the orientation is nonmonotonic and reproduced very well by the calculation in the framework of the crystal field theory. The discrepancies between experimental and theoretical dependences in the orientation in high magnetic fields are attributed to the magnetostriction effects. © 2008 IOP Publishing Ltd.

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